Micropurge Sampling - General

Fixed-volume purging by high-rate pumping can adequately remove the overlying stagnant water from a well, while allowing for representative sample collection. However practitioners and researchers have determined that these practices may pose significant scientific and practical concerns. These include:

- High pumping rates, portable pumps, and bailers can greatly increase the turbidity of samples, which can cause false-positive analytical results and interfere with sample analysis. Turbid samples typically require filtration, adding to the time and cost involved in sampling and analysis (Puls et al. 1992 and Heidlauf and Bartlett 1993).

- Bailers, while inexpensive and potentially efficient in shallow wells, can introduce bias or error in sample results due to aeration, sample agitation, surging, and handling of the bailer at the well head.

- In low-yield wells, complete dewatering of the well (if the removal rate exceeds the recharge rate of the well) can cause jetting of water through the well screen openings, aerating the sample water and further affecting sample chemistry (Giddings 1983).

- High pumping rates can cause mixing of chemically-distinct water zones within aquifer, diluting or averaging the sample, and often further spreading contaminants within the aquifer.

- Excessive high-rate pumping of monitoring wells can lead to damage to the filter pack and annular seal of the wells.

- Conventional purging produces large volumes of purged water, which must be properly handled by field technicians.

- Where the groundwater is contaminated or regulatory requirements specify, this purged water must be contained in tanks or drums and often removed for offsite treatment or disposal, increasing sampling costs.

- Worker safety may be compromised in handling large volumes of purge water.

Potential Advantages and Disadvantages of Micropurge Sampling

There are several advantages to the micropurge process, the most obvious being the savings in time spent purging wells and the greatly reduced volume of purge water that must be handled. Additional advantages to micropurge sampling are as follows:

- Sample quality may be improved through reduced turbidity in samples and minimized degassing and volatilization. In most cases, filtration of samples can be eliminated.

- Sample accuracy and precision are also improved. Low-rate, low-volume pumping reduces mixing and dilution effects on the conentration of contaminants improving consistency with each sampling event.

- Sampling systems are simpler and less expensive since the need for high-flow purging pumps is eliminated.

- Micropurge sampling can extend the useful life of a monitoring well and preserve the integrity of the filter pack by reducing the movement of fine sediments into the well that result form high-rate pumping.

- Health and safety advantage include reduced exposure of field personnel to potentially-contaminated purge water and reduced liability from the offsite disposal of this water.

- Cost savings are realized due to reduced labor, handling, treatment, and disposal of purge water.

There are also potential disadvantages to the micropurge method related to a conversion to the micropurge from the standard accepted method. Regulatory acceptance of micropurge sampling for groundwater characterization was withheld in one case at a Department of Defense petroleum release site in southern California due to the regulators belief that such low flow sampling was not representative of the actual drinking water obtained by higher flow rate pumps used for private water supply[1]. A greater concern to the INEEL is that the conversion to micropurge sampling from the current method may jepoardize acceptance of future analytical results due to a potential lack of comparability to the historical data. It is the intent of this micropurge study to resolve these issues through direct comparison of micropurge samples to samples collected through the standard higher flow rate purging method, which are also representative of drinking water generated by typical pumping rates for private water supply.